CONTROL OF PRODUCTION IN THE PETROLEUM INDUSTRY

BY

RICHARD CHESTER RYNIKER

B.S., University of Illinois, 1938

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AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN ECONOMICS IN THE GRADUATE SCHOOL OF THE UNIVERSITY OF ILLINOIS, 1941

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CONTROL OF PRODUCTION IN THE PETROLEUM INDUSTRY

The purpose of this study is to determine by what group or groups the production of petroleum is controlled, what control mechanisms are used, and what objectives are sought. There can be no doubt that this industry, like many others in the United States, is directed toward specific objectives by definite control mechanisms, but little attempt heretofore has been made to analyze these completely or to evaluate them in relation to the general public good.

Formerly the primary sources of data were the large petroleum companies and the American Petroleum Institute, a trade association dominated by large oil corporations, both of which furnish information favorable to themselves and often ignore the unfavorable. But the reports of Federal investigating committees, together with the records of state regulatory commissions and the Interstate Oil Compact Commission, now make possible a more completely documented study of the production segment of the petroleum industry than has been possible heretofore.

The most frequently consulted sources of information for the preparation of this thesis have been the testimony of oil-men and government officials before a Sub-committee of the Committee on Interstate and Foreign Commerce, known as the 1934 Cole Committee, authorized by House Resolution 441 of the 73rd Congress (Recess), before the 1939-1940 Cole Committee, authorized by House Resolution 290 of the 76th Congress (Third Session), and before the Temporary National Economic Committee. The technical reports submitted to each of the committees have also been studied. Other source material has included the official proceedings of the Interstate Oil Compact Commission, the Railroad Commission of Texas, the Oklahoma Corporation Cimmission, as well as the leading petroleum-industry trade journals, and standard texts dealing with petroleum production problems.

Although it is justifiable and necessary, an important limita-

tion in this study is the concentration of interest upon the production segment of the industry, leaving transportation, manufacturing, and marketing together with their interrelations, largely untouched. The justification for not dealing with the industry as a whole lies in the limitation of time and the fact that unbiased investigations of the manufacturing, transporting, and marketing branches have not yet been made, and in fact until very recently were impossible.

Certain terms used in this study must be defined. The first three are—physical loss, physical waste, and economic waste. If petroleum is justifiably lost forever in any manner except desirable use, there has been physical loss; if the social costs necessary to prevent the loss are less than the social benefits which would accrue from the recovered crude, there has been physical waste; if the social costs of obtaining the oil are greater than the benefit obtained, whether or not because of physical production difficulties, or secondly, if the costs are unnecessarily large because of duplication of facilities, even though less than the benefits received, there has been economic waste. The measure of justifiability is the balancing of the social value of the quantity of oil lost against the social costs necessary to prevent the loss. Two other definitions must also be explained. The first is production, which refers to the obtaining of oil from a well by pumping or by means of the internal pressure in the reservoir. The second is abandonment. An abandoned well is one which is permanently discarded. All of the equipment is removed from the wellsite, and the hole is filled with cement or mud fluid and plugged at the top.

From its very start the petroleum industry in the United States has been characterized by over-production, growing stocks, overflowing tanks, and declining prices. Efforts to stimulate demand by selling oil at low prices led to its purchase for unwise, uneconomic uses. The newly created demand then caused thousands of additional wells to be brought into production, which in turn forced even more oil onto the market. The cycle has recurred many times and still operates, although its force is less than formerly.

The physical characteristics of petroleum, the legal framework in which it is produced, and the organizational structure of the industry foster this instability and waste. The rule of capture gives to each owner or lessee of oil land all the oil and natural gas he is able to get from the wells sunk in his tract. But the propensity of petroleum to migrate makes it possible for an owner or lessee to take what was once under the land of a neighbor or of many neighbors in addition to that under his own land. This migratory propensity, however, also makes it possible for the neighbor or neighbors to take petroleum from under the owner or lessee's land. The result is an economically and physically wasteful race to produce as rapidly as possible with little regard for the extent of ultimate recovery or the cost of recovery. If one person does not get the oil immediately, his neighbor will.

The quantity of oil underground which has been located and can be obtained would satisfy demand at its existing level for approximately fourteen years, if this oil could be brought to the surface rapidly enough. Members of the petroleum industry frequently point out that at no time in the history of the industry have reserves exceeded twenty years demand and that additional productive areas from which oil could be obtained at reasonable costs always were found when they were needed.

Many of the tracts of land from which additional reserves were obtained to meet the steadily increasing demand for petroleum products had not been known to contain oil. Their discovery opened thousands of acres for exploitation. But during the last eleven years, few new fields have been found and those which were discovered were either small, shallow pools from which only a small quantity of oil could be obtained or small pools which could be reached only by drilling extremely deep, expensive wells. Additional reserves made available in the last decade have come primarily from the extension of known productive areas.

Three methods have been used to increase the "known recoverable reserves" in these older areas. First, vertical extension by drilling new and deeper wells within the productive area,

or re-drilling older wells to deeper oil sands; second, drilling additional wells to the same producing sand but over a larger area in an effort to enlarge the known field horizontally; and third, re-pressuring or water-flooding areas known to be productive to secure additional oil without drilling more wells.

Contrary to most public assertions emanating from major oil company executives and even from some state regulatory officials, additional petroleum reserves are becoming increasingly difficult and expensive to find. The 1941-1942 budgets of the major oil companies contain the largest appropriations ever made for the search of oil. The increased demand for petroleum products, especially gasoline, and the anticipated increase in the future make imperative the discovery of additional oil if even the existing precarious ratio (14-1) between reserves and demand is maintained.

In 1899, petroleum furnished only 4.5 per cent and natural gas only 3.2 per cent of the country's energy supply. But by 1937, petroleum had increased in relative importance to 32.4 per cent and natural gas to 10.4 per cent. This increase is attributable in part to the shifting from coal to oil by some consumers, but largely to new forms of transportation which use petroleum as their fuel. The present problem, however, is not merely that of providing, at any price, a supply of oil to meet this increased demand, but rather that of insuring a supply of petroleum for future needs at costs not made high by policies or production techniques now employed, which are justified by short-run objectives only.

At the present time, most of the oil fields in the United States are operated under orders from state authorities or in accordance with federally approved plans, but the objectives of many of these plans are those of the private groups rather than of the public as a whole. The advantages accruing to the general public which are attributable to this regulation are largely incidental or secondary. The private groups have been able to make their will effective because of their large concentrations of capital and their integration of functions. Regulations purporting to be

primarily for the public good in reality are often merely screens for the activities of the large integrated companies.

The twenty dominant petroleum corporations, called the "majors", favor widespread curtailment of production as the most effective method of bringing higher prices which increase their profits. They are powerful enough to control to a large extent the actual promulgation and enforcement of the production restrictions of several of the states, to influence greatly several others, and are alert to the fact that the decreased supply of crude on the market will put them in a more rather than a less advantageous position. They often are able to arrange the curtailment so that smaller competitors are forced to shut in their production more than they in proportion to the productive ability of each group.

The stronger companies want governmental regulation to lessen the duplication of investment which is made necessary by the rule of capture and the migratory propensity of oil, and to assist them in controlling the weaker companies. But regulation is satisfactory to them only when it does not jeopardize their strong monopoly position. These companies want to sell the same quantity of oil at the same prices as they did without regulation, but they want to lessen the amount of capital required to secure the crude oil, to process it, and to sell the finished products to the ultimate consumer.

The smaller enterprises—independent producers, royalty owners, independent refiners, intrastate pipeline operators, supply men, oil field workers, and lease and royalty brokers—usually do not want curtailment because it decreases their immediate income. Their business does not cover enough different functions so that the losses from one can be offset by the gains of others, nor do they have sufficient monopoly power to insure a large return from a relatively small volume of business. These non-integrated independents prefer a large volume of business, even though the return per unit is small.

There is no apparent possibility that the United States will suffer from an absolute physical shortage of petroleum in the

near future (ten years). But there is another more immediate problem which must be considered. The rate and cost of discovering additional reserves, together with the increasing demand for petroleum products all indicate that the cost of crude petroleum will increase sharply in the near future. If supplies of petroleum should diminish 10 or 15 per cent, the prices in the industry might be doubled. Petroleum production controls must be evaluted in relation to two criteria. The first is the actual physical quantity of oil available; the second is the price at which the oil is obtainable.

The explanation for the present widespread disregard of conservation lies in its unprofitableness to the petroleum companies. Merely urging producers to adopt conservation practices and policies does not accomplish anything if their adoption means smaller profits or business ruin. Decisions within the petroleum industry are made by private groups which seek to perpetuate themselves. These groups will not adopt production techniques or management policies which, in relation to the existing inflated cost structure, are unprofitable or those which in the long run would be advantageous but in the short run would decrease their profits. Their strong monopoly position makes unnecessary the adoption of efficient recovery practices.

The inflated costs in the petroleum industry, attributable to the rule of capture and monopoly, cause millions of barrels of crude oil to be abandoned which should have been obtained and would have been obtained if unnecessary duplication and monopoly manipulation had not made their recovery unprofitable. Production of oil by marginal wells is and will continued to be important until our total reserves become so great and production costs so low that the reserves of the high-cost production wells will not be needed, but this time certainly has not yet come, nor is there any acceptable reason to believe that it will. Petroleum should be taken from the reservoirs in such a way that the maximum amount of oil is recovered by ordinary methods and the reserves remaining underground are left available for later production at reasonable costs when there is need for them. The present undesirable cost structure prevents the utilization of

the most efficient engineering techniques which would increase the immediate recovery, and the failure to adopt these efficient practices makes the later recovery of these reserves unnecessarily expensive.

Prorationed recovery, which is the most widely adopted production control mechanism in use at the present time, is more desirable than unrestricted, wide-open production. But even the best, most efficiently administered proration plan cannot achieve anything approaching complete conservation. In practice, any degree of conservation which is attained by proration plans is incidental to the primary purpose of most of them, which is stability within the industry and profitable returns on the inflated cost structure. This objective, however, has been attained only in part. The rule of capture operates in a prorationed field just as in any other with the result that excess drilling has not been curtailed and a large potential productive capacity has been created which continually threatens the price structure of the industry.

Unit development of petroleum pools, which gives primary emphasis to the geological structure of the reservoir rather than to surface property lines, is the most advantageous petroleum exploitation method. Legal recognition of the right of owners or lessees of surface tracts to obtain only the oil and gas under their own land makes unnecessary the drilling of more wells than needed to utilize most advantageously the natural energy of the pool. The rate of production can be controlled to obtain the most oil possible before resorting to expensive secondary recovery methods; production can be curtailed when the price offered for crude falls to the point where it does not cover costs; and physical waste can be lessened by eliminating practices which decrease the geological efficiency of the reservoir. Unitization also makes unnecessary the production of crude oil in such large quantities that much of it must be stored in above-ground tanks or be consumed in low-value, uneconomic uses.

Unitization by itself, however, is not a complete conservation program. Cooperative development of petroleum reservoirs does not insure an adequate supply of oil by discounting the future,

nor does it control the uses in which crude is consumed, except perhaps indirectly by withholding some oil from the market when the price offered for it is very low. Nor does cooperative exploitation insure that the most efficient production techniques will be employed. Unified technical operation merely offers the possibility for maximum, efficient, low-cost recovery, but does not guarantee it; the complete advantage of unitization is realized only when it is combined with the best engineering techniques covering the whole range of activity from drilling and production to the final abandonment of exhausted wells.

Unit operation can bring efficient production more easily than any other exploitation plan. But under the control of the twenty dominant oil companies in the United States, it often is used as a monopoly tool to increase and stabilize earnings rather than to achieve the desirable objectives of conservation.

Because it is impossible to determine with finality whether society would be better off if some policy other than the one adopted had prevailed in an extractive industry, it is difficult to formulate a conservation program acceptable to all interests involved. But this difficulty is not sufficient basis for failing to attempt to direct the petroleum industry toward socially desirable objectives.

Many persons contend that unitization should be compulsory in all newly discovered fields, and in as large a portion of older fields as possible with justice; that governmental regulatory bodies uncontrolled by private groups should be charged with the duty of directing the activities of the petroleum industry toward socially desirable goals.

The political and economic power of the "majors" leads to the assertion that a Federal regulatory commission must be given this responsibility if the regulation is to be effective because the large, integrated companies are not strong enough to control Federal Government bureaus so completely or so easily as they can those of the states. In addition, there is the argument that imports and exports can be better regulated and more highly skilled administrative personnel can be employed when the in-

dustry is regulated by the Federal Government. There is also the belief that Federal control is necessary because of the interstate aspects of the petroleum industry. Crude oil is recovered in one state, processed in another, and consumed in a third, with the result that state governments can control only a part of the industry. But regulation adequate for any one segment of the industry is possible only when all phases are controlled by the regulatory body, contend advocates of Federal control.

The most frequently repeated objection offered to Federal regulation is the assertion that the present control mechanism of the states, coordinated by the Interstate Oil Compact is functioning as well or better than any Federal body could, largely because it is decentralized and therefore close to the actual problems encountered. There can be no doubt that existing state regulation is effective within its given frame of reference; but the objectives of this control are those of the private groups. Conservation is not attained, nor do many states actually seek its attainment.

There is ample reason to believe, based on a study of the extreme power of the majors, that Federal control of the petroleum industry, just as most state control, would merely be a useful tool for the attainment of the objectives of the private groups. It is probable that only by changing the most basic institutions within the industry, notably the substitution of public for private ownership of the crude oil reserves and pipelines, can the present short-run objectives of the monopoly groups be replaced by long-run, socially desirable goals.

The crux of the petroleum problem is the weighing of the present and the future. If there were no reason to believe that this country would ever suffer from a shortage of petroleum, because of an actual scarcity alone or a physical shortage made doubly disadvantageous because of the high cost of recovering the last reserves, there probably would be no case for widespread regulation of the petroleum industry or nationalization of petroleum reserves and pipelines. But all acceptable scientific data indicate that such an optomistic supposition cannot be accepted. The importance of a supply of petroleum available for future use

makes necessary some action to insure that this supply will be available. The short-run, profit objectives of private groups make necessary an almost complete discounting of the future, whereas the longer-run, social objective makes imperative a less drastic discounting.

A Federal regulatory body probably can be strong enough to break the undesirable monopoly of the twenty major oil companies if it does not have to overcome the special privilege of the majors based on their actual ownership of the underlying reserves and their ownership of pipelines. But this Federal regulatory body must have the power to control all four segments of the petroleum industry, and to take whatever action is necessary to achieve its ends.

Price control alone is not an adequate regulatory tool. Rationing, which has not been investigated in this study and therefore cannot be discussed in detail, is necessary, both in peace time and war time, to curtail uneconomic uses of petroleum. Direct, positive regulation must also be used to insure the adoption of the most efficient engineering techniques, many of which now are not adopted because the monopoly position of the majors makes their use unnecessary.

At the present time, most of the policies and practices in the petroleum industry are based on the desire of the private groups to attain objectives which are advantageous to them but which, especially because of the importance and scarcity of petroleum, are disadvantageous to the general public. Short-run objectives must be replaced by long-run goals and there is little possibility of this transition being made until the power of the private groups, based on their ownership of petroleum reserves and pipelines, is broken. Nationalization of pipelines and of the unrecovered supplies of oil will make effective the Federal Government regulation designed to curtail physical and economic waste, to insure low costs, and a smaller discounting of the future.

VITA

Richard Chester Ryniker was born in Quincy, Illinois, April 5, 1915. He received his elementary education in the public schools of Quincy, Illinois, and graduated from Champaign, Illinois, High School in 1933. In September 1934, he entered the University of Illinois, being granted the Bachelor of Science degree in June 1938. The Master of Science degree in Business Organization and Operation was conferred in June 1939. During the academic year 1939-1940, he held the National Tea Company Fellowship in Marketing. Throughout the academic year 1940-1941, he has been a University Fellow in Economics and has devoted his time to the preparation of this thesis.